INTERNATIONAL STANDARD 2801

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Clothing for protection against heat and fire — General recommendations for users and for those in charge of such users

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2801 was drawn up by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, and circulated to the Member Bodies in March 1972.

It has been approved by the Member Bodies of the following countries :

Austria	Germany	Romania
Belgium	Hungary	South Africa, Rep. of
Canada	Japan	Sweden
Chile	New Zealand	Switzerland
Czechoslovakia	Norway	Turkey
Egypt, Arab Rep. of	Poland	United Kingdom
France	Portugal	U.S.S.R.

The Member Body of the following country expressed disapproval of the document on technical grounds :

Finland

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Clothing for protection against heat and fire — General recommendations for users and for those in charge of such users

1 SCOPE AND FIELD OF APPLICATION

This International Standard lists the rules and elementary precautions that it is essential to know and observe in regard to clothing for protection against heat and fire. It is designed to be understood by people without any scientific background and for use as a "Check-List" for those responsible for checking safety requirements and recommendations.

This document also contains the recommendations which are generally valid for all clothing according to their type or kind, for protection against heat and fire, so eliminating the necessity of referring to them in every standard and other documents prepared by ISO/TC 94/SC 9.

When national standards or rulings specify regulations other than those given in this document, the stricter specifications should be applied.

2 IMPORTANT PRELIMINARY REMARKS

Generally speaking, it is essential to realise first of all that no clothing for protection against heat and fire can offer unlimited protection.

Comments: A very large number of variable and interdependent factors affect the time that such clothing can offer protection in an area of heat and fire (state of health, training, physical effort, atmospheric conditions, air speed, etc.). For one and the same garment, this period may vary enormously from one operator to another.

It is also particularly important to realize that, if the operator has an accident or feels unwell, the absence of movement on his part reduces the circulation of air inside the garment and may increase the effects of the external heat.

3 OPERATORS

3.1 State of health

Any person likely to use a garment giving protection against heat and fire must be free from any physical or mental defects, especially if he is to wear a breathing apparatus.

Comments: Abnormal conditions of work (high temperature, wearing a breathing apparatus, restriction of freedom of movement, etc.) submit the organism to additional effort which greatly reduces the time of intervention, even of a person in excellent health. The limited time would be considerably reduced again, or may even be rendered non-existent, in the case of a person in poor physical condition (for example, cardio-vascular or sweat gland deficiency) or mental condition (panic).

3.2 Training

Protective clothing against intense heat with or without fire shall only be used by persons who undergo systematic training in its use.

Comments: Even with the best protective clothing against intense heat and fire, the time for intervention is limited by the intensity of the heat acting from the exterior, by the degree to which the operator is accustomed to heat and by the operator's physical effort and endurance.

Regular training, therefore, has several objectives, the most important of which are:

- to acquire a routine to permit the reduction to a minimum of the time required to put on the clothing and special equipment;
- to keep the operator informed of the properties and limiting factors of the material he is to wear;
- to accustom the operator to move about in such clothing;
- to allow the operator to accustom his body to prolonged effort, while learning to recognize his physiological limit of endurance, and also to assess the approach of the moment when he is still able to retreat from the danger zone in total safety.

Attention is drawn to the fact that the training of operators should be carried out with garments corresponding to those used in practical operations. It is therefore recommended that old clothing of the same type and style should be used and kept exclusively for training. (See 8.1.)

4 MATERIALS

4.1 Fusible materials

Persons likely to find themselves in an area where there is a risk of heat or fire shall not wear clothing or underclothing made of fusible material next to the skin even if they are protected by special garments.

Comments: In case of deterioration of the protective garment, fusible materials (such as certain synthetic textiles and other thermo-plastic materials) may melt under the effects of heat, and when in direct contact with the skin may cause severe burns endangering the life of the operator.

It should be noted that the extent of the burn is a very important factor. In many cases an extensive first degree burn is more dangerous than a localized second or even third degree burn.

4.2 Permeable and absorbent materials

Persons clothed in permeable garments or in garments of which the material of the outer layer has the capacity of absorbing water or flammable products (liquids, dusts, gases or vapours) shall be aware of the danger of entering an area of intense heat or fire when those garments have been in, or are likely to come into, contact with such products.

It should particularly be noted that specific safety measures shall be taken to prevent permeable or absorbent garments from coming into contact with liquid oxygen.

Comments: Outer garments made of woven, porous or absorbent materials may cause difficulties to the wearer and expose him to dangers resulting, for example, from:

- absorption of flammable liquids such as oils and hydrocarbons;
- absorption of water or other non-flammable liquids which, under the effect of heat, may turn to steam and cause burns;
- absorption of non-flammable liquids which may decompose into toxic vapours under the effect of heat;
- catching fire of materials which are in themselves non-flammable but which may catch fire by acting as a wick (products which facilitate combustion).

5 ELECTRICITY

5.1 Static electricity

The attention of the users is drawn to the fact that certain garments may become charged with, and cause a discharge of, static electricity. The use of such garments is dangerous in areas contaminated by explosive or flammable gases.

Comments: The purpose of this recommendation is to act as a reminder not only of the hazards that discharges of static electricity in general may cause but also of the fact, frequently overlooked, that these discharges may be caused by parts of the personal equipment. The danger which these discharges of static electricity represent depends on their intensity, on the concentration of gases and on the flash-points of the gases.

5.2 Electric shock — Electrocution

Before entering an area where there is an electrical hazard, the person in charge of rescue operations or fire fighting shall ensure that electricity supply systems, that are likely to be a hazard, have been separated from the supply source.

6 SAFETY PROVISIONS

6.1 Operational groups

In order to provide against any failures on the part of people and equipment, any operation requiring special protective clothing or equipment shall be carried out by a group of at least two men who are in constant physical contact with each other and with a safety station situated outside the danger area.

At this safety station, for each group taking part in the operation, there shall be a stand-by group of at least the same number of men, protected at least as effectively as the first group, ready to take immediate action at the slightest alert.

Comments: This recommendation may seem exaggerated, particularly since it immobilizes a part of the staff in order to be prepared for a hypothetical emergency. However, it should be remembered that many national standards provide for operational groups of at least three people, particularly when respiratory equipment is used. (See 3.1.)

6.2 Cooling by wetting

Unless the garment has been specially designed for it, it shall never be cooled by wetting. (See 4.2.)

6.3 Illumination

Wherever possible, the operational area should be illuminated.

7 INSPECTION, STORAGE, MAINTENANCE, ETC.

7.1 Inspection

Garments for protection against heat and fire shall be checked at regular intervals and maintained in perfect condition. Particular attention shall be paid to the fastening devices to make sure they are operating properly.

Any defects that are discovered or suspected shall be pointed out to the manufacturer or his certified representative who is responsible for declaring that the garment is capable of offering protection corresponding to its classification in accordance with the standards laid down.

Comments: The inspection of the state of the garments is especially responsible work. It requires special technical knowledge and often special equipment.

7.2 Storage

The manufacturer's recommendations regarding the conditioning and storage of clothing shall be strictly oberved.

Each type of garment shall be arranged in a group for rapid identification of its classification.

A check shall be made at regular intervals to see that all these recommendations are observed.